

NEC04P018-H1a **AFTER FINAL: EXPEDITED ACTION** 01480088aa  
Amendment dated 08/26/2008 Reply to office action mailed 06/09/2008

The following is a complete listing of all claims in the application, with an indication of the status of each:

**Listing of claims:**

- 1 1. (canceled)
- 1 2. (currently amended) A network connection system for connecting a first communication network and a plurality of user terminals when a second communication network is interposed between said first communication network and said plurality of user terminals, said second communication network employing a second protocol different from a first protocol employed in said first communication network, said system comprising:
  - 7 a scheduling apparatus including:
    - 8 a classification processing unit for classifying data conforming
    - 9 to said first protocol received from said communication network based
    - 10 on quality guaranteed classes set thereto;
    - 11 an overhead amount correction unit for correcting an overhead
    - 12 amount between a data rate associated with said first protocol and a
    - 13 data rate associated with said second protocol to convert received rate
    - 14 information on said second protocol to the rate based on said first
    - 15 protocol;
    - 16 a weighting coefficient calculation unit for calculating a
    - 17 weighting coefficient based on said rate calculated by said overhead
    - 18 amount correction unit such that a minimally guaranteed rate is
    - 19 assured for a minimum rate guaranteed class among classes classified
    - 20 by said classification processing unit;

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21 a weighting scheduler for scheduling data conforming to said  
22 first protocol of said minimum rate guaranteed class and of a  
23 weighting applied class among said classified classes based on the  
24 weighting coefficient calculated by said weighting coefficient  
25 calculation unit to deliver the data in accordance with the scheduling;  
26 and

27 a scheduler for scheduling the data conforming to said first  
28 protocol from said weighting scheduler such that the data conforming  
29 to said first protocol is delivered at a transmission rate equal to or  
30 lower than said rate calculated by said overhead amount correction  
31 unit to deliver the data in accordance with the scheduling;

32 a protocol converter for converting the data conforming to said first  
33 protocol after said scheduling apparatus has shaped the transmission rate  
34 therefor to data conforming to said second protocol; and

35 a multiplexer including a current ~~data-rate~~ detector for supplying said  
36 scheduling apparatus with said rate information as indicative of a currently set  
37 reception rate for said user terminals, said multiplexer being configured to  
38 transmit to each of said user terminals the data conforming to said second  
39 protocol from said protocol converter or the data conforming to said first  
40 protocol after said scheduling apparatus has shaped the transmission rate  
41 therefor.

1 3. (currently amended) A network connection system for connecting a first  
2 communication network and a plurality of user terminals when a second  
3 communication network is interposed between said first communication  
4 network and said plurality of user terminals, said second communication  
5 network employing a second protocol different from a first protocol employed  
6 in said first communication network, said system comprising:

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7 a scheduling apparatus including:  
8       a classification processing unit for classifying data conforming  
9       to said first protocol received from said communication network based  
10      on quality guaranteed classes set thereto;  
11       an overhead amount correction unit for correcting an overhead  
12      amount between a data rate associated with said first protocol and a  
13      data rate associated with said second protocol to convert received rate  
14      information on said second protocol to the rate based on said first  
15      protocol;  
16       a weighting coefficient calculation unit for calculating a  
17      weighting coefficient based on said rate calculated by said overhead  
18      amount correction unit such that a minimally guaranteed rate is  
19      assured for the minimum rate guaranteed class among classes  
20      classified by said classification processing unit;  
21       a weighting scheduler for scheduling data conforming to said  
22      first protocol of said minimum rate guaranteed class and of a  
23      weighting applied class among said classified classes based on the  
24      weighting coefficient calculated by said weighting coefficient  
25      calculation unit to deliver the data in accordance with the scheduling;  
26      and  
27       a preferential control scheduler for scheduling the data  
28      conforming to said first protocol from said weighting scheduler, and  
29      data conforming to said first protocol of a best-effort class among said  
30      classified classes such that the data conforming to said first protocol is  
31      delivered at a transmission rate equal to or lower than said rate  
32      calculated by said overhead amount correction unit, and for  
33      preferentially scheduling the data conforming to said first protocol  
34      from said weighting scheduler, and delivering the data conforming to

35                   said first protocol of the best-effort class at a timing at which there is  
36                   no data conforming to said first protocol from said weighting  
37                   scheduler;  
38                   a protocol converter for converting the data conforming to said first  
39                   protocol after said scheduling apparatus has shaped the transmission rate  
40                   therefor to data conforming to said second protocol; and  
41                   a multiplexer including a current ~~data-rate~~ detector for supplying said  
42                   scheduling apparatus with said rate information as indicative of a currently set  
43                   reception rate for said user terminals, said multiplexer being configured to  
44                   transmit to each of said user terminals the data conforming to said second  
45                   protocol from said protocol converter or the data conforming to said first  
46                   protocol after said scheduling apparatus has shaped the transmission rate  
47                   therefor.

1                   4. (currently amended) A network connection system for connecting a first  
2                   communication network and a plurality of user terminals when a second  
3                   communication network is interposed between said first communication  
4                   network and said plurality of user terminals, said second communication  
5                   network employing a second protocol different from a first protocol employed  
6                   in said first communication network, said system comprising:  
7                   a scheduling apparatus including:  
8                    a classification processing unit for classifying data conforming  
9                    to said first protocol received from said communication network based  
10                   on quality guaranteed classes set thereto;  
11                    a rate measuring unit for measuring a transmission rate for a  
12                    preferential class among said classified classes;  
13                    an overhead amount correction unit for correcting an overhead  
14                    amount between a rate based on said second protocol and a rate based

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15 on said first protocol to convert received rate information on said  
16 second protocol to the rate based on said first protocol;  
17 a weighting coefficient calculation unit for calculating a  
18 weighting coefficient based on said rate calculated by said overhead  
19 amount correction unit and the transmission rate for the preferential  
20 class measured by said rate measuring unit such that a minimally  
21 guaranteed rate is assured for the minimum rate guaranteed class  
22 among the classes classified by said classification processing unit;  
23 a weighting scheduler for scheduling data conforming to said  
24 first protocol of said minimum rate guaranteed class and of a  
25 weighting applied class among said classified classes based on the  
26 weighting coefficient calculated by said weighting coefficient  
27 calculation unit to deliver the data in accordance with the scheduling;  
28 and  
29 a preferential control scheduler for scheduling the data  
30 conforming to said first protocol of said preferential class, the data  
31 conforming to said first protocol from said weighting scheduler, and  
32 data conforming to said first protocol of a best-effort class among said  
33 classified classes such that the data conforming to said first protocol is  
34 delivered at a transmission rate equal to or lower than said rate  
35 calculated by said overhead amount correction unit, and for  
36 preferentially scheduling the data conforming to said first protocol of  
37 said preferential class, preferentially scheduling the data conforming  
38 to said first protocol from said weighting scheduler at a timing at  
39 which there is no data conforming to said first protocol of said  
40 preferential class, and delivering the data conforming to said first  
41 protocol of the best-effort class at a timing at which there is no data  
42 conforming to said first protocol from said weighting scheduler;

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43                   a protocol converter for converting the data conforming to said first  
44                   protocol after said scheduling apparatus has shaped the transmission rate  
45                   therefor to data conforming to said second protocol; and

46                   a multiplexer including a current data-rate detector for supplying said  
47                   scheduling apparatus with said rate information as indicative of a currently set  
48                   reception rate for said user terminals, said multiplexer being configured to  
49                   transmit to each of said user terminals the data conforming to said second  
50                   protocol from said protocol converter or the data conforming to said first  
51                   protocol after said scheduling apparatus has shaped the transmission rate  
52                   therefor.

1                   5. (currently amended) A network connection system for connecting a first  
2                   communication network and a plurality of user terminals when a second  
3                   communication network is interposed between said first communication  
4                   network and said plurality of user terminals, said second communication  
5                   network employing a second protocol different from a first protocol employed  
6                   in said first communication network, said system comprising:

7                   a scheduling apparatus including:

8                   a classification processing unit for classifying data conforming  
9                   to said first protocol received from said communication network based  
10                   on quality guaranteed classes set thereto;

11                   a rate measuring unit for measuring a transmission rate for a  
12                   preferential class among said classified classes;

13                   an overhead amount correction unit for correcting an overhead  
14                   amount between a rate based on said second protocol and a rate based  
15                   on said first protocol to convert received rate information on said  
16                   second protocol to the rate based on said first protocol;

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17 a preferential class upper limit setting unit, operative when the  
18 difference between the transmission rate of the data conforming to said  
19 first protocol of the preferential class as measured by said rate  
20 measuring unit and said rate calculated by said overhead amount  
21 correction unit is lower than a minimally guaranteed rate for a  
22 minimum rate guaranteed class among the classes classified by said  
23 classification processing unit, for setting an upper limit to the  
24 transmission rate for said preferential class for shaping, such that the  
25 minimally guaranteed rate can be assured for said minimum rate  
26 guaranteed class:

27 a weighting coefficient calculation unit, operative when said  
28 preferential class upper limit setting unit does not set the upper limit,  
29 for calculating a weighting coefficient based on said rate calculated by  
30 said overhead amount correction unit and the transmission rate for the  
31 preferential class measured by said rate measuring unit such that the  
32 minimally guaranteed rate is assured for the minimum rate guaranteed  
33 class among the classes classified by said classification processing  
34 unit, said weighting coefficient calculation unit being further operative  
35 when said preferential class upper limit setting unit sets the upper  
36 limit, for calculating a weighting coefficient based on said rate  
37 calculated by said overhead amount correction unit and the upper limit  
38 rate set by said preferential class upper limit setting unit such that the  
39 minimally guaranteed rate is assured for said minimum rate guaranteed  
40 class;

41 a weighting scheduler for scheduling data conforming to said  
42 first protocol of said minimum rate guaranteed class and of a  
43 weighting applied class among said classified classes based on the  
44 weighting coefficient calculated by said weighting coefficient

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45 calculation unit to deliver the data in accordance with the scheduling;  
46 and  
47 a preferential control scheduler for scheduling the data  
48 conforming to said first protocol of said preferential class, the data  
49 conforming to said first protocol from said weighting scheduler, and  
50 data conforming to said first protocol of a best-effort class among said  
51 classified classes, such that the data conforming to said first protocol is  
52 delivered at a transmission rate equal to or lower than said rate  
53 calculated by said overhead amount correction unit, and for  
54 preferentially scheduling the data conforming to said first protocol of  
55 said preferential class, preferentially scheduling the data conforming  
56 to said first protocol from said weighting scheduler at a timing at  
57 which there is no data conforming to said first protocol of said  
58 preferential class, and delivering the data conforming to said first  
59 protocol of the best-effort class at a timing at which there is no data  
60 conforming to said first protocol from said weighting scheduler;  
61 a protocol converter for converting the data conforming to said first  
62 protocol after said scheduling apparatus has shaped the transmission rate  
63 therefor to data conforming to said second protocol; and  
64 a multiplexer including a current data rate detector for supplying said  
65 scheduling apparatus with said rate information as indicative of a currently set  
66 reception rate for said user terminals, said multiplexer being configured to  
67 perform DSL processing using telephone lines to transmit to each of said user  
68 terminals the data conforming to said second protocol from said protocol  
69 converter or the data conforming to said first protocol after said scheduling  
70 apparatus has shaped the transmission rate therefor.

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1       6. (currently amended) A network connection system for connecting a first  
2       communication network and a plurality of user terminals when a second  
3       communication network is interposed between said first communication  
4       network and said plurality of user terminals, said second communication  
5       network employing a second protocol different from a first protocol employed  
6       in said first communication network, said system comprising:  
7               a scheduling apparatus including:  
8                       a classification processing unit for classifying data conforming  
9                       to said first protocol received from said communication network based  
10                       on quality guaranteed classes set thereto;  
11                       an overhead amount correction unit for correcting an overhead  
12                       amount between a rate based on said second protocol and a rate based  
13                       on said first protocol to convert received rate information on said  
14                       second protocol to the rate based on said first protocol;  
15                       a weighting coefficient calculation unit for calculating a  
16                       weighting coefficient based on said rate calculated by said overhead  
17                       amount correction unit and the transmission rate for a preferential  
18                       class among said classified classes using information fed back from  
19                       said user terminals such that a minimally guaranteed rate is assured for  
20                       the minimum rate guaranteed class among the classes classified by  
21                       said classification processing unit;  
22                       a weighting scheduler for scheduling data conforming to said  
23                       first protocol of said minimum rate guaranteed class and of a  
24                       weighting applied class among said classified classes based on the  
25                       weighting coefficient calculated by said weighting coefficient  
26                       calculation unit to deliver the data in accordance with the scheduling;  
27                       and

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28 a preferential control scheduler for scheduling the data  
29 conforming to said first protocol of said preferential class, the data  
30 conforming to said first protocol from said weighting scheduler, and  
31 data conforming to said first protocol of a best-effort class among said  
32 classified classes such that the data conforming to said first protocol is  
33 delivered at a transmission rate equal to or lower than said rate  
34 calculated by said overhead amount correction unit, and for  
35 preferentially scheduling the data conforming to said first protocol of  
36 said preferential class, preferentially scheduling the data conforming  
37 to said first protocol from said weighting scheduler at a timing at  
38 which there is no data conforming to said first protocol of said  
39 preferential class, and delivering the data conforming to said first  
40 protocol of the best-effort class at a timing at which there is no data  
41 conforming to said first protocol from said weighting scheduler;  
42 a protocol converter for converting the data conforming to said first  
43 protocol after said scheduling apparatus has shaped the transmission rate  
44 therefor to data conforming to said second protocol; and  
45 a multiplexer including a current data-rate detector for supplying said  
46 scheduling apparatus with said rate information as indicative of a currently set  
47 reception rate for said user terminals, said multiplexer being configured to  
48 perform DSL processing using telephone lines to transmit to each of said user  
49 terminals the data conforming to said second protocol from said protocol  
50 converter or the data conforming to said first protocol after said scheduling  
51 apparatus has shaped the transmission rate therefor.

1       7. (currently amended) A network connection system for connecting a first  
2       communication network and a plurality of user terminals when a second  
3       communication network is interposed between said first communication

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4 network and said plurality of user terminals, said second communication  
5 network employing a second protocol different from a first protocol employed  
6 in said first communication network, said system comprising:  
7 a scheduling apparatus including:  
8 a classification processing unit for classifying data conforming  
9 to said first protocol received from said communication network based  
10 on quality guaranteed classes set thereto;  
11 an overhead amount correction unit for correcting an overhead  
12 amount between a rate based on said second protocol and a rate based  
13 on said first protocol to convert received rate information on said  
14 second protocol to the rate based on said first protocol;  
15 a preferential class upper limit setting unit, operative when the  
16 difference between the transmission rate for a preferential class among  
17 said classified classes determined to be using information fed back  
18 from said user terminals and said rate calculated by said overhead  
19 amount correction unit is lower than a minimally guaranteed rate for a  
20 minimum rate guaranteed class among the classes classified by said  
21 classification processing unit, for setting an upper limit to the  
22 transmission rate for said preferential class for shaping such that the  
23 minimally guaranteed rate can be assured for said minimum rate  
24 guaranteed class;  
25 a weighting coefficient calculation unit, operative when said  
26 preferential class upper limit setting unit does not set the upper limit,  
27 for calculating a weighting coefficient based on said rate calculated by  
28 said overhead amount correction unit and the transmission rate for the  
29 preferential class such that the minimally guaranteed rate is assured for  
30 said minimum rate guaranteed class, said weighting coefficient  
31 calculation unit being further operative when said preferential class

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32 upper limit setting unit sets the upper limit, for calculating a weighting  
33 coefficient based on said rate calculated by said overhead amount  
34 correction unit and the upper limit rate set by said preferential class  
35 upper limit setting unit such that the minimally guaranteed rate is  
36 assured for said minimum rate guaranteed class;

37 a weighting scheduler for scheduling data conforming to said  
38 first protocol of said minimum rate guaranteed class and of a  
39 weighting applied class among said classified classes based on the  
40 weighting coefficient calculated by said weighting coefficient  
41 calculation unit to deliver the data in accordance with the scheduling;  
42 and

43 a preferential control scheduler for scheduling the data  
44 conforming to said first protocol of said preferential class, the data  
45 conforming to said first protocol from said weighting scheduler, and  
46 data conforming to said first protocol of a best-effort class among said  
47 classified classes such that the data conforming to said first protocol is  
48 delivered at a transmission rate equal to or lower than said rate  
49 calculated by said overhead amount correction unit, and for  
50 preferentially scheduling the data conforming to said first protocol of  
51 said preferential class, preferentially scheduling the data conforming  
52 to said first protocol from said weighting scheduler at a timing at  
53 which there is no data conforming to said first protocol of said  
54 preferential class, and delivering the data conforming to said first  
55 protocol of the best-effort class at a timing at which there is no data  
56 conforming to said first protocol from said weighting scheduler;  
57 a protocol converter for converting the data conforming to said first  
58 protocol after said scheduling apparatus has shaped the transmission rate  
59 therefor to data conforming to said second protocol; and

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60                   a multiplexer including a current ~~data rate~~ detector for supplying said  
61                   scheduling apparatus with said rate information as indicative of a currently set  
62                   reception rate for said user terminals, said multiplexer being configured to  
63                   perform DSL processing using telephone lines to transmit to each of said user  
64                   terminals the data conforming to said second protocol from said protocol  
65                   converter or the data conforming to said first protocol after said scheduling  
66                   apparatus has shaped the transmission rate therefor.

1                   8-11. (canceled)

1                   12. (original) A traffic shaping method, in a network connection system for  
2                   connecting a communication network and a plurality of user terminals, for  
3                   shaping a transmission rate for data conforming to a first protocol from said  
4                   communication network, said method comprising the steps of:

5                   classifying data conforming to said first protocol received from said  
6                   communication network based on quality guaranteed classes set thereto;

7                   correcting an overhead amount between a rate based on a second  
8                   protocol and a rate based on said first protocol to convert received rate  
9                   information on said second protocol to the rate based on said first protocol;

10                  calculating a weighting coefficient such that a minimally guaranteed  
11                  rate is assured for a minimum rate guaranteed class among said classified  
12                  classes based on said calculated rate;

13                  scheduling data conforming to said first protocol of said minimum rate  
14                  guaranteed class and of a weighting applied class among said classified  
15                  classes based on the calculated weighting coefficient to deliver the data in  
16                  accordance with the scheduling; and

17                  scheduling the data conforming to said first protocol after said  
18                  weighting, and data conforming to said first protocol of a best-effort class

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19 among said classified classes, such that the data conforming to said first  
20 protocol is delivered at a transmission rate equal to or lower than said  
21 calculated rate, and for preferentially scheduling the data conforming to said  
22 first protocol after said weighting, so that the data conforming to said first  
23 protocol of said best effort class is delivered at a timing at which there is no  
24 data conforming to said first protocol after said weighting.

1 13. (canceled)

1 14. (original) A traffic shaping method, in a network connection system for  
2 connecting a communication network and a plurality of user terminals, for  
3 shaping a transmission rate for data conforming to a first protocol from said  
4 communication network, said method comprising the steps of:

5 classifying data conforming to said first protocol received from said  
6 communication network based on quality guaranteed classes set thereto;

7 measuring a transmission rate for a preferential class among said  
8 classified classes;

9 correcting an overhead amount between a rate based on a second  
10 protocol and a rate based on said first protocol to convert received rate  
11 information on said second protocol to the rate based on said first protocol;

12 calculating a weighting coefficient based on said calculated rate and  
13 the transmission rate measured for the preferential class such that a minimally  
14 guaranteed rate is assured for a minimum rate guaranteed class among the  
15 classified classes;

16 scheduling data conforming to said first protocol of said minimum rate  
17 guaranteed class and of a weighting applied class among said classified  
18 classes based on the calculated weighting coefficient to deliver the data in  
19 accordance with the scheduling; and

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20 scheduling the data conforming to said first protocol of said  
21 preferential class, the data conforming to said first protocol after said  
22 weighting, and data conforming to said first protocol of a best-effort class  
23 among said classified classes such that the data conforming to said first  
24 protocol is delivered at a transmission rate equal to or lower than said  
25 calculated rate, and for preferentially scheduling the data conforming to said  
26 first protocol of said preferential class, preferentially scheduling the data  
27 conforming to said first protocol after said weighting at a timing at which  
28 there is no data conforming to said first protocol of said preferential class, and  
29 delivering the data conforming to said first protocol of the best-effort class at  
30 a timing at which there is no data conforming to said first protocol after said  
31 weighting.

1 15. (original) A traffic shaping method, in a network connection system for  
2 connecting a communication network and a plurality of user terminals, for  
3 shaping a transmission rate for data conforming to a first protocol from said  
4 communication network, said method comprising the steps of:

5 classifying data conforming to said first protocol received from said  
6 communication network based on quality guaranteed classes set thereto;

7 measuring a transmission rate for a preferential class among said  
8 classified classes;

9 correcting an overhead amount between a rate based on said second  
10 protocol and a rate based on said first protocol to convert received rate  
11 information on said second protocol to the rate based on said first protocol;

12 when the difference between said measured transmission rate of the  
13 data conforming to said first protocol of the preferential class and said  
14 calculated rate is lower than a minimally guaranteed rate for a minimum rate  
15 guaranteed class among said classified classes, setting an upper limit to the

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16 transmission rate for said preferential class for shaping such that the  
17 minimally guaranteed rate can be assured for said minimum rate guaranteed  
18 class;

19 calculating a weighting coefficient based on said calculated rate and  
20 said transmission rate measured for the preferential class such that a  
21 minimally guaranteed rate is assured for said minimum rate guaranteed class,  
22 when the upper limit rate is not set for said preferential class, and calculating  
23 a weighting coefficient based on said calculated rate and said set upper limit  
24 rate such that the minimally guaranteed rate is assured for said minimum rate  
25 guaranteed class when the upper limit rate is set for said preferential class;

26 scheduling data conforming to said first protocol of said minimum rate  
27 guaranteed class and of a weighting applied class among said classified  
28 classes based on said calculated weighting coefficient to deliver the data in  
29 accordance with the scheduling; and

30 scheduling the data conforming to said first protocol of said  
31 preferential class, the data conforming to said first protocol after said  
32 weighting, and data conforming to said first protocol of a best-effort class  
33 among said classified classes such that the data conforming to said first  
34 protocol is delivered at a transmission rate equal to or lower than said  
35 calculated rate, preferentially scheduling the data conforming to said first  
36 protocol of said preferential class, preferentially scheduling the data  
37 conforming to said first protocol after said weighting at a timing at which  
38 there is no data conforming to said first protocol of said preferential class, and  
39 delivering the data conforming to said first protocol of the best-effort class at  
40 a timing at which there is no data conforming to said first protocol after said  
41 weighting.

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1        16. (original) A traffic shaping method, in a network connection system for  
2        connecting a communication network and a plurality of user terminals, for  
3        shaping a transmission rate for data conforming to a first protocol from said  
4        communication network, said method comprising the steps of:

5                classifying data conforming to said first protocol received from said  
6        communication network based on quality guaranteed classes set thereto;

7                correcting an overhead amount between a rate based on a second  
8        protocol and a rate based on said first protocol to convert received rate  
9        information on said second protocol to the rate based on said first protocol;

10                calculating a weighting coefficient based on said calculated rate and  
11        the transmission rate for a preferential class among said classified classes  
12        determined to be using information fed back from said user terminals such  
13        that a minimally guaranteed rate is assured for a minimum rate guaranteed  
14        class among said classified classes;

15                scheduling data conforming to said first protocol of said minimum rate  
16        guaranteed class and of a weighting applied class among said classified  
17        classes based on said calculated weighting coefficient; and

18                scheduling the data conforming to said first protocol of said  
19        preferential class, the data conforming to said first protocol after said  
20        weighting, and data conforming to said first protocol of a best-effort class  
21        among said classified classes such that the data conforming to said first  
22        protocol is delivered at a transmission rate equal to or lower than said  
23        calculated rate, preferentially scheduling the data conforming to said first  
24        protocol of said preferential class, preferentially scheduling the data  
25        conforming to said first protocol after said weighting at a timing at which  
26        there is no data conforming to said first protocol of said preferential class, and  
27        delivering the data conforming to said first protocol of the best-effort class at

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28 a timing at which there is no data conforming to said first protocol after said  
29 weighting.

1 17. (original) A traffic shaping method, in a network connection system for  
2 connecting a communication network and a plurality of user terminals, for  
3 shaping a transmission rate for data conforming to a first protocol from said  
4 communication network, said method comprising the steps of:

5 classifying data conforming to said first protocol received from said  
6 communication network based on quality guaranteed classes set thereto;

7 correcting an overhead amount between a rate based on a second  
8 protocol and a rate based on said first protocol to convert received rate  
9 information on said second protocol to the rate based on said first protocol;

10 when the difference between the transmission rate for a preferential  
11 class among said classified classes determined using information fed back  
12 from said user terminals and said calculated rate is lower than a minimally  
13 guaranteed rate for a minimum rate guaranteed class among said classified  
14 classes, setting an upper limit to the transmission rate for said preferential  
15 class for shaping such that the minimally guaranteed rate can be assured for  
16 said minimum rate guaranteed class;

17 calculating a weighting coefficient based on said calculated rate and  
18 the transmission rate for the preferential class such that the minimally  
19 guaranteed rate is assured for said minimum rate guaranteed class, when the  
20 upper limit rate is not set for said preferential class, and calculating a  
21 weighting coefficient based on said calculated rate and said upper limit rate  
22 set for said preferential class such that the minimally guaranteed rate is  
23 assured for said minimum rate guaranteed class, when the upper limit rate is  
24 set for said preferential class;

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25 scheduling data conforming to said first protocol of said minimum rate  
26 guaranteed class and of a weighting applied class among said classified  
27 classes based on said calculated weighting coefficient; and

28 scheduling the data conforming to said first protocol of said  
29 preferential class, the data conforming to said first protocol after said  
30 weighting, and data conforming to said first protocol of a best-effort class  
31 among said classified classes such that the data conforming to said first  
32 protocol is transmitted at a transmission rate equal to or lower than said  
33 calculated rate, preferentially scheduling the data conforming to said first  
34 protocol of said preferential class, preferentially scheduling the data  
35 conforming to said first protocol after said weighting at a timing at which  
36 there is no data conforming to said first protocol of said preferential class, and  
37 delivering the data conforming to said first protocol of the best-effort class at  
38 a timing at which there is no data conforming to said first protocol after said  
39 weighting.

1 18. (original) The traffic shaping method according to claim 12, wherein said  
2 first communication network is an IP network, said data conforming to said  
3 first protocol is an IP packet, said second network is an ATM network, and  
4 said data conforming to said second protocol is an ATM cell.